

satisfactory. We have now however a paper before us, by Dr. A. Mayr, read at the Bombay Medical Union, April 21, 1900, dealing with more recent trials, in which there were 38·2 per cent. of recoveries in 403 patients treated, the recoveries of patients under ordinary treatment being 19·5 per cent.

Whether the nucleo-proteid be used as a prophylactic to inoculate persons or to immunise horses to prepare a curative serum, it is evident that the antitoxin given rise to in the person or the horse is an antitoxin against the poisonous nucleo-proteid; the stakes in the race for recovery are all placed on the nucleo-proteid.

But it is not improbable that the metabolic products formed by the plague microbe in the medium it grows on—be it the body or an artificial medium—require to be immunised against, and herein lies the distinction between Haffkine's prophylactic and Lustig's nucleo-proteid used as a prophylactic. Haffkine uses the bodies of the bacilli together with the broth they have grown in, for he considers the broth acted upon by their growth to be useful if not essential. This has been shown to be the case in experiments on animals by Dr. Balfour Stewart (*British Medical Journal*, March 3, 1900).

Lustig's nucleo-proteid prophylactic has some technical advantages in its preparation over Haffkine's, but for the reasons pointed out above it is not likely to be as efficacious. C. B. S.

A Monograph of the Erysiphaceae. By Ernest S. Salmon, F.L.S. "Memoirs" of the Torrey Botanical Club. Vol ix., Pp. 292. (New York: 1900).

THE Torrey Botanical Club has performed a valuable service to mycologists in the publication of this excellent monograph of the Erysiphaceæ, a group of parasitic fungi causing the diseases known as white mildew, powdery mildew, blight, *Mehlthau*, *blanc*, &c. In their conidial or "oidium" stage they are common throughout the summer on various host-plants, such as roses, hops, vines, peas, maples, and many wild plants, giving a mealy appearance to the part infected; while in the later summer or autumn the perfect asclegerous form is produced in the form of dark brown or black spots, consisting of peritheces containing ascospores, and usually provided with characteristic appendages.

The number of known species of this well differentiated group of fungi is not large; the author describes forty-nine, including a very few new ones, in addition to a number of well-marked varieties. These are arranged in six genera, *Podosphæra*, *Sphærotheca*, *Uncinula*, *Microsphæra*, *Erysiphe*, and *Phyllactinia*. Great confusion exists in the nomenclature of the European species, and the author corrects several prevalent errors. He regards the ascus as the result of a true sexual process, and does not support Dangeard's view that the fusion of the nuclei in the young ascus is of sexual signification.

The monograph is illustrated by nine plates, and is supplemented by a very copious bibliography, in which no less than 400 distinct works or papers are referred to, and a host-index of the plants attacked by these fungi.

A. W. B.

An Old Man's Holidays. By The Amateur Angler. Pp. xii + 140. (London: Sampson Low, Marston and Co., 1900.)

"AN AMATEUR ANGLER" is an observer of nature as well as an enthusiastic Waltonian, the result being that these holiday sketches contain here and there an observation of interest to naturalists. Referring to the growing scarcity of kingfishers he says, "This is partly owing to the fact that they have the credit of being destructive enemies of young trout; the fact is, they do feed on little fishes, but not so much on trout as on minnows, dace, sticklebacks, miller's thumbs, and even leeches." The book contains several illustrations of rural scenes.

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LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Buchner's Zymase.

THE most recently issued number of the *Proceedings of the Royal Society* (No. 438) contains a paper by Dr. McFadyen, Dr. Morris and Mr. Rowland on the subject of Buchner's zymase, which is held by many observers to be the alcohol-producing enzyme of yeast.

The authors describe a long series of experiments which they have carried out, partly on Buchner's lines, and partly by new methods of their own. They find, as Buchner and other investigators have done, that yeast will, under proper conditions, yield up an extract which can set up alcoholic fermentation in a solution of cane sugar. Many very interesting points have come out during the progress of their work, the explanation of which is not at present very obvious; their conclusion, however, seems to call for a very careful scrutiny of the operations, especially as it has been advanced by other writers also. They state at the end of their paper that their experiments cause them to doubt the existence of an enzyme, and lead them rather "in the direction of a theory which refers the phenomenon to the vital activity of the yeast-cell protoplasm" (p. 265).

In reviewing their experiments it is noticeable that, in their preparation, the yeast was mixed with a certain proportion of kieselguhr, and subjected in this condition to the enormous pressure of 200-300 atmospheres (p. 252). The liquid thus expressed was capable of filtration under pressure through a Chamberland or Berkefeld filter (p. 259) without losing its properties, though the process decreased its power. It was miscible with, or soluble in, a small quantity of water or solution of cane-sugar without being altogether destroyed, though too much of the solvent inhibited its action (p. 262). The experiments were conducted throughout in the presence of antiseptics, such as 1 per cent. of sodium arsenite, thymol, or toluol (p. 254).

It will be difficult for physiologists to accept a conception of a protoplasm which is not destroyed by such a pressure as was used, and which afterwards becomes to some extent soluble in water, or, at any rate, miscible with it, which can be filtered through a porcelain filter without destruction, and which can carry on an anabolic and subsequently a katabolic process (p. 265) in the presence of such antiseptics as were used.

The authors say in an earlier part of the paper (p. 253) that such a kieselguhr "sponge" as they obtained during the extraction of the yeast was capable of retaining almost entirely the globulins of eggs, and, to a large extent, albumin and serum proteins. It seems strange after this to find them holding the view that protoplasm itself was not retained by such a "sponge."

It is a little difficult to reconcile their concluding theory of a fluid protoplasm with their statement (p. 253) that the juice they obtained and used was in every case far removed in nature from the condition in which it existed when alive in the yeast cell, even if one were to admit that the *juice* was ever living at all. Is it possible, in their opinion, for the anabolic and katabolic activities of protoplasm to be manifested in such a juice as they describe in those words? Yet their final hypothesis is that the yeast juice exhibits the "vital activity of the yeast-cell protoplasm."

I venture to disagree with their conclusion. In my own experiments, which were published in the *Annals of Botany*, vol. xii (1898), p. 491, I found that an active preparation could be obtained by grinding the yeast with kieselguhr in such proportion that a perfectly dry impalpable powder resulted, and then extracting the latter with a solution of cane-sugar. It is hardly credible that protoplasm without the protection of cell-walls, can resist desiccation. The action of the extract in my experiments, as in theirs, was considerable in the presence of antiseptics which, in the proportions used, were inevitably and rapidly fatal to the life of protoplasm.

Cambridge, November 19. J. REYNOLDS GREEN.

Euclid i. 32 Corr.

MR. TUCKER is right (p. 58) in his conjecture that Clavius was not the first to publish these corollaries.

References:—P. Ramus (ob. 1572), "*Scholarum Mathematicorum Libris unus et triginta. A Lazaro Schonero recogniti et emendati*,"

p. 180. Francofurti, 1599; H. Billingsley, the first English translation of the "Elements of Euclid," Fol. 42. (London, 1570); N. Tartalea Brisciano, "Euclide," Fol. 32. (Venetia, 1565); J. Peletarius, "In Euclidis Elementa Geometrica Demonstrationum Libri sex." Prop. 32. *Appendix a Campano*, pp. 33, 34. (Lugduni, 1557).

It is much to be regretted that in this country so little importance is attached to the history of mathematics; otherwise, such mistakes as those mentioned by Mr. Tucker would not be repeated from one text book to another.

Galway, November 17.

GEORGE J. ALLMAN.

Instruments of Precision at the Paris Exhibition.

IN your issue of November 15 (p. 61) is an account of "Instruments of Precision at the Paris Exhibition," in which it is stated that a catalogue of 250 pages has been prepared by the German Association of Mechanicians and Opticians. May I ask you to state in some future issue how that catalogue can be obtained, as I am anxious to get a copy of it?

E. T. WARNER.

H.M.S. *Britannia*, Dartmouth, November 21.

I AM much interested in the article in the number of NATURE for November 15, on optical and other instruments at the Paris Exhibition. Although I visited the exhibition, I did not see the exhibit, as I went too soon after the opening. I should much like to obtain the catalogue mentioned. Will you kindly tell me where I should be able to obtain one by writing for it?

H. DAVIDGE.

Seafeld Park College, Crofton, Hants, November 17.

[For information as to the German Catalogue of Scientific Instruments, application should be made to Dr. Robert Drostén, Bureau de l'Exposition allemande des Instruments de Precision, Classe 15, Section 3, Exposition Universelle, Paris. If Dr. Drostén is not in Paris, letters will probably be forwarded. The secretary of the German Committee of Management is Prof. St. Lindeck, Reichsanstalt, Charlottenburg, Berlin, who no doubt would send a catalogue.—ED. NATURE.]

ON SOLAR CHANGES OF TEMPERATURE AND VARIATIONS IN RAINFALL IN THE REGION SURROUNDING THE INDIAN OCEAN.¹

I.

THE fact that the abnormal behaviour of the widened lines in the spectra of sunspots since 1894 had been accompanied by irregularities in the rainfall of India suggested the study and correlation of various series of facts which might be expected to throw light upon the subject.

The conclusions already arrived at from bringing together the results of several investigations undertaken with this view may be stated as follows:—

(1) It has been found from a discussion of the chemical origin of lines most widened in sunspots at maxima and minima periods that there is a considerable rise above the mean temperature of the sun around the years of sunspot maximum and a considerable fall around the years of sunspot minimum.

(2) It has been found from the actual facts of rainfall in India (during the S.W. monsoon) and Mauritius, between the years 1877 and 1886,² as given by Blanford and Meldrum, that the effects of these solar changes are felt in India at sunspot maximum, and in Mauritius at sunspot minimum. Of these the greater is that produced in the Mauritius at sunspot minimum. The pulse at Mauritius

¹ By Sir Norman Lockyer, K.C.B., F.R.S., and W. J. S. Lockyer, M.A. (Camb.). Ph.D. (Gött.). Paper read before the Royal Society on November 22.

² This period was selected because the Kensington observations of widened lines only began in 1879, and the collected rainfall of India has only been published to 1886.

at sunspot minimum is also felt in India, and gives rise generally to a secondary maximum in India.

India therefore has two pulses of rainfall, one near the maximum and the other near the minimum of the sunspot period.

(3) It has been found that the dates of the beginning of these two pulses on the Indian and Mauritius rainfall are related to the sudden remarkable changes in the behaviour of the widened lines.

(4) It has been found from a study of the Famine Commission reports that all the famines therein recorded which have devastated India during the last half century (we have not yet carried the investigation further back) have occurred in the intervals between these two pulses.

(5) It has been found from the investigation of the changes in (1) the widened lines, (2) the rainfall of India and (3) of the Mauritius during and after the last maximum in 1893 that important variations from those exhibited during and after the last maximum of 1883 occurred in all three.

It may be stated at the same time that the minimum of 1888-1889 resembled the preceding minimum of 1878-1879.

(6) It has been found from an investigation of the Nile curves between the years 1849 and 1878 that all the lowest Niles recorded have occurred between the same intervals.

(7) The relation of the intervals in question to the droughts of Australia and of Cape Colony, and to the variations in the rainfall of extra tropical regions generally has not yet been investigated. We have found, however, a general agreement between the intervals and the rainfall of Scotland (Buchan), and have traced both pulses in the rainfalls of Córdoba (Davis) and the Cape of Good Hope.

(8) We have had the opportunity of showing these results to the Meteorological Reporter to the Government of India and Director-General of Indian Observatories, John Eliot, Esq., C.I.E., F.R.S., who is now in England, and he allows us to state his opinion that they accord closely with all the known facts of the large abnormal features of the temperature, pressure and rainfall in India during the last twenty-five years, and hence that the inductions already arrived at will be of great service in forecasting future droughts in India.

Solar Physics Observatory, October 26.

ADDENDUM.

Since Meldrum and one of us called attention, in 1872 to a possible connection between sunspots and rainfall, there has been a large literature upon the subject which it is not necessary for us to analyse; it may be simply stated that, in spite of the cogent evidence advanced since, chiefly by Meldrum, and in later years by Mr. Hutchins,¹ it is not yet generally accepted that a case for the connection has been made out.

What has been looked for has been a change at maximum sunspots only; the idea being that there might be an effective change of solar temperature, either in excess or defect, at such times; and that there would be a gradual and continuous variation from maximum to maximum.

At the same time, it is possible that the pressure connection, first advanced by Chambers, is now accepted by meteorologists as a result of the recent work of Eliot.

The coincidence, during the last few years, of an abnormal state of the sun with abnormal rain in India, accompanied by the worst famine experienced during the century, suggested to us the desirability of reconsidering the question, especially as we have now some new factors at our disposal. These have been revealed by the study, now extending over twenty years, of the widened lines in sunspots, which suggested the view that two effects ought to be expected in a sunspot cycle instead of one.

¹ "Cycles of Drought and Good Seasons in South Africa, 1889."